

REMARKS

The Office Action dated June 28, 2006 has been received and carefully noted. The above amendments to the claims and the following remarks are submitted as a full and complete response thereto.

Claims 1-26, 31-44, 51-54, and 57-59, are amended to more particularly point out and distinctly claim the subject matter of the present invention and new claims 60-65 are added. Support for the amendments is found at least in paragraph [0025] - [0027], [0030], [0039] and [0040] of the present specification. No new matter is added. Claims 1-65 are respectfully submitted for consideration.

The Office Action objected to claims 18 and 52 because of informalities. Applicant respectfully submits that claims 18 and 52 are amended to correct any known typographical informalities. Accordingly, withdrawal of the objection to claims 18 and 52 is respectfully requested.

The Office Action rejected claims 1-3, 5-15, 17, 19, 23-25, 29-32, 34-45, 49, 51 and 53 under 35 U.S.C. 103(a) as being obvious over US Patent No. 6,249,680 to Wax et al. (Wax), in view of US Patent No. 6,275,186 to Kong (Kong), in further view of US Patent No. 6,009,334 to Grubeck et al. (Grubeck). The Office Action took the position that Wax disclosed all of the features of these claims except for transmitting an identifier signal and receiving two identifier signals, which the Office Action asserts is disclosed by Kong, and the feature of channel estimation and estimating by means of the received identifier signal, a spatial signature of the channels, which the Office Action asserts is

disclosed by Grubbeck. Applicant respectfully submits that the cited references taken individually or in combination, fail to disclose or suggest all of the features recited in any of the pending claims.

Claim 1, from which claims 2-30 depend is directed to a method for performing positioning in a radio system. At least one identifier signal is transmitted to at least two different channels, each identifier signal being suited for channel estimation. A receiver receives said at least one identifier signal through at least two different channels. The method further includes estimating, on the basis of the at least one received identifier signal from the at least two different channels, a spatial signature of the channels. Information related to the location of a receiver or a transmitter of the at least one identifier signal is defined on the basis of the spatial signature.

Claim 31, from which claims 32-59 depend, is directed to a radio system configured to perform positioning. The radio system includes a transmitter, a receiver and at least one base station. The transmitter includes an antenna that includes at least two antenna elements. The transmitter is configured to transmit at least one identifier signal to at least two different channels, each identifier signal being suited for channel estimation. The receiver is configured to receive the at least one identifier signal. The receiver is configured to estimate, on the basis of the at least one received identifier signal from the at least two different channels, a spatial signature of the channels. The positioning is configured to define, based on the spatial signature, information related to the location of a receiver or a transmitter of the at least one identifier signal.

Embodiments of the present invention are directed to the direction of transmission (DoT) or spatial signatures. Applicants respectfully submit that each of the pending claims recite features that are neither disclosed nor suggested in any of the cited references.

Wax is directed to location finding in a CDMA wireless communication system that uses multi-path signals in order to accurately determine a transmitter's location. Direct path and multi-path signals from a mobile transmitter arrive at an array of p antennas belong to a cellular network base station. A location finding apparatus connected to the base station contains a multi-channel receiver that uses PN sequence information provided by the base station receiver to despread the p signals and the separate each of the p signals into temporally distinct multi-path parts.

Kong is directed to locating a mobile station (MS) in a mobile communication system. When an MS receives signals synchronized to a predetermined time from at least one adjacent base station and is located within a serving BS of the at least one BS, an analog-to-digital converter converts the received BS signals to digital chip sample data, a memory stores the chip sample data, a dedicated searcher detects at least two signals by correlating the chip sample data by off-line processing and calculates the signal-to-interference ratios (SIR) and time difference of arrival (TDOA) of the two signals and a controller estimates the MS location based on the SIR and TDOA received from the dedicated searcher.

Grubeck is directed to determining the distance between a radio receiver and a radio transmitter, by special processing of the received radio signals that have been transmitted repeatedly from the same radio transmitter and are possibly subject to multi-path propagation. The time of arrival (TOA) of the received radio signals is repeatedly estimated using channel power profiles. A TOA value near the minimum occurring TOA is selected wherein each estimated TOA is derived from incoherent integration of a randomly chosen number of the received bursts having the same known bit sequence, in order to eliminate the influence of noise.

Applicants respectfully submit that the cited references fail to disclose or suggest at least the feature of transmitting at least one identifier signal to at least two different channels, each identifier signal being suited for channel estimation, as recited in claim 1 and similarly recited in claim 31.

The cited references do not mention, disclose or suggest, the feature of transmitting the identifier signals being suited for channel estimation. The present application according to certain embodiments is directed to direction of transmission (DoT) or spatial signatures related to that. The cited references do not disclose or suggest direction of transmission and instead are directed to direction of arrival (DoA). For example see Fig. 4 and column 5 lines 49-59 of Wax, the Abstract and column 3 lines 41-52 of Kong, and the Abstract of Grubeck. The DoT and the DoA are essentially different from each other. DoT can be computed when a transmitter has at least two antenna elements or at least two lobes (radiation patterns). DoA requires several antenna elements

in the receiver. This distinction is further evidenced from at least Fig 3 section [0033] – [0035] of the present application. Thus, the cited references cannot either individually or in combination, disclose or suggest the feature of transmitting at least one identifier signal to at least two different channels, each identifier signal being suited for channel estimation.

Applicant respectfully submits that because claims 2, 3, 5-15, 17, 19, 23-25, 29, 30, 32, 34-45, 49, 51, 53 and 557-59 depend from claims 1 and 31, these claim are allowable at least for the same reasons as claims 1 and 31, as well as for the additional features recited in these dependent claims.

Based at least on the above, Applicant respectfully submits that the cited references fail to disclose or suggest all of the features recited in claims 1-3, 5-15, 17, 19, 23-25, 29-32, 34-45, 49, 51, 53 and 57-59. Accordingly, withdrawal of the rejection under 35 U.S.C. 103(a) is respectfully requested.

The Office Action rejected claims 4, 20, 27, 28, 33, 47, 48 and 54 under 35 U.S.C. 103(a) as being obvious over Wax, Kong and Grubeck, in further view of US Patent No. 6,351,499 to Paulraj et al. (Paulraj). The Office Action took the position that Wax, Kong and Grubeck disclosed all of the features of these claims except for the feature of transmitting an identifier from at least two different antenna elements in order to transmit the identifier signals through at least two different channels. The Office Action asserted that Paulraj disclosed this feature. Applicant respectfully submits that the cited

references taken individually or in combination, fail to disclose or suggest all of the features recited in any of the pending claims.

Applicant respectfully submits that Wax, Kong and Grubeck are deficient at least for the same reasons discussed above regarding claims 1 and 31, and Paulraj fails to cure these deficiencies.

Wax, Kong and Grubeck are discussed above. Paulraj is directed to maximizing a communication parameter, such as data capacity, signal quality or throughput of a channel between a transmit unit with M transmit antennas and a receive unit with N receive antennas and a communication system such as a wireless network. However, Paulraj fails to cure the deficiencies discussed above regarding claims 1 and 31.

Based at least on the above, Applicant respectfully submits that the cited references fail to disclose or suggest all of the features of claims 4, 20, 27, 28, 33, 47, 48 and 54. Accordingly withdrawal of the rejection under 35 U.S.C. 103(a) of claims 4, 20, 27, 28, 33, 47, 48 and 54 is respectfully requested.

The Office Action rejected claims 21, 26 and 55 under 35 U.S.C. 103(a) as being obvious over Wax, Kong and Grubeck, in further view of US Patent No. 6, 011,974 to Cedervall et al. (Cedervall). The Office Action took the position that Wax, Kong and Grubeck disclosed all of the features of these claims except the feature of a terminal that serves as the receiver and performs its own positioning. The Office Action asserted that Cedervall disclosed this feature. Applicant respectfully submits that the cited references fail to disclose or suggest all of the features recited in any of the above claims.

Applicant submits that Wax, Kong and Grubeck are deficient at least for the reasons discussed above regarding claims 1 and 31, and Cedervall fails to cure these deficiencies.

Wax, Kong and Grubeck are discussed above. Cedervall is directed to improving the accuracy of a location estimation measurement within a telecommunication system. Transmissions from surrounding base transceiver systems are received by a reference location device and any inter-base transceiver system timing differences resolved. A location estimate of the mobile station within the telecommunication system is then obtained. However, Cedervall does not cure the deficiencies of Wax, Kong and Grubeck.

Based at least on the above, Applicant respectfully submits that the cited references fail to disclose or suggest all of the features recited in claims 21, 26 and 55. Accordingly, withdrawal of the rejection under 35 U.S.C. 103(a) of claims 21, 26 and 55 is respectfully requested.

The Office Action objected to claims 18 and 52 for being dependent from a rejected base claim. Applicant respectfully submits that because claims 18 and 52 depend from claims 1 and 31, these claims are allowable in their present form. Accordingly, withdrawal of the objection to claims 18 and 52 is respectfully requested.

New claims 60-65 are added. Applicant respectfully submits that each of claims 60-65 recite features that are neither disclosed nor suggested in any of the cited references.

Applicant respectfully submits that each of claims 1-65 recite features that are neither disclosed nor suggested in any of the cited references. Accordingly, it is respectfully requested that each of claims 1-65 be allowed and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the applicant respectfully petitions for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,



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Enclosures: Petition for Extension of Time
Additional Claim Fee Transmittal
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